STRUCTURED FISCHER-TROPSCH CATALYST SYSTEM AND METHOD

ABSTRACT OF THE DISCLOSURE

A Fischer-Tropsch catalyst for the conversion of synthesis gas into Fischer-Tropsch products includes a stationary Fischer-Tropsch catalyst having a voidage ratio greater than approximately 0.45 or 0.6 and may further have a catalyst concentration for a given reactor volume of at least 10 percent. A Fischer-Tropsch catalyst has a structured shape promoting non-Taylor flow and/or producing a productivity in the range of 200 - 4000 vol CO/vol. Catalyst/hour or greater over at least a 600 hour run of a Fischer-Tropsch reactor with the catalyst therein. A system for converting synthesis gas into longer-chain hydrocarbon products through the Fisher-Tropsch reaction has a reactor for receiving synthesis gas directly or as a saturated hydrocarbon liquid or a combination, and a stationary, structured Fischer-Tropsch catalyst disposed within the reactor for converting at least a portion of the synthesis gas into longer-chain hydrocarbons through Fischer-Tropsch reaction. A Fischer-Tropsch reactor system having a structured Fischer-Tropsch catalyst may have an all-liquid saturated reactant feed, an all gas reactant feed, or a plethora of combinations therebetween. The systems may or may not include heat removal devices. Methods of manufacturing catalysts and converting synthesis gas are also presented.